Responding: Jack Brittain, PhD, Vice President Technology Ventures, University of Utah

- Technology Ventures includes all technology commercialization, including patenting, licensing, start-up support, and commercial-sponsored research.
- University of Utah tied for #1 with MIT for the number of spinoffs in the 2008 Association of University Technology Managers (AUTM survey). The U's 2008 federal sponsored research was $200 million and MIT's 2008 federal sponsored research was $1.2 billion.
- The 2008 AUTM survey results indicate the average university starts one company for every $88.6 million in research funding. The University of Utah started one company for every $13.7 million in research funding.

Part I: With Respect to University Research, Promising Practices and Successful Models

What are some promising practices and successful models for fostering commercialization and diffusion of university research? What is the evidence that these approaches are successful? How could these promising practices be more widely adopted? Examples include, but are not limited to:

The University of Utah was an "average" university in 2004, with 2 spinoff companies and average licensing income. In the 2006 AUTM Survey, the U was second only to MIT in the number of spinoffs launched, number one in spinoffs per research dollar, and in the top 15 in revenues derived from commercialization. In the 2008 AUTM Survey, the University of Utah tied MIT for #1 in spinoffs, was #1 in spinoffs for research dollars, in the top 10 in commercialization yield from research dollars, and in the top 10 in intellectual property production per research dollar. An NSF sponsored study done by Oregon State University ranked the University of Utah #1 in commercialization effectiveness in 2008 and 2009.

Beyond rankings, the economy of Utah has benefitted from:

- An estimated 1,684 jobs created since 2005 with a payroll of $87,568,000 producing $4,738,400 in annual state income tax revenues.
- Approximately 28,128 Utah jobs are attributable to the economic impact of University of Utah spinoffs with $1.5 billion in annual payroll expenditures producing over $73 million in state income taxes per year.

The key to the University of Utah's success is "total mission integration."

- We are not outside the University. We support educational programs, research and service and are at the core of the university.
- The University of Utah is a better university on every dimension as a result of integrating commercialization within the mission of the university.

Business plan competitions

University of Utah student competitions and educational programs served over 1,100 students in 2009-10. These include:

- 94 student inventions produced for the statewide Tech Titans competition (the University of Utah funds and provides all coordination for this statewide competition).
- 154 student business plans submitted to the Utah Entrepreneur Challenge, many of which were developed at the Opportunity Quest competitions on each of 11 university and college campuses in Utah (all funded and coordinated by the University of Utah with the exception of the BYU campus competition).

Over 30 companies have been launched in Utah in the past 5 years with student teams writing the business plans and providing initial staffing and support.

- Omniture, a web analytics company founded by two students in a basement, was recently acquired by Adobe.
- Other noteworthy businesses founded based on University of Utah student business plans are Adobe, Pixar, and JetBlue.

The University of Utah is also home to the nation's largest student-run private equity fund, the University Venture Fund. It has over $18 million in investment dollars under management. The University hosts the National Student Private Equity Fund Conference every year in conjunction with the Sundance Film Festival and hosts 150 students from other institutions interested in a career in new venture financing.

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     Coursework, training programs, and experiential learning that give
faculty and students the skills they need to become entrepreneurs

     Programs that encourage multidisciplinary collaboration between
faculty and students in different disciplines, such as science,
engineering, business, and medicine
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Majors, minors, joint degrees, and experiential programs are all part of the University of Utah model. We also have many opportunities in different disciplines for students to develop expertise suitable for participation in the innovation economy (e.g., IP law clinic in the law school). All programs are self-funded, i.e. with sponsorships and other community support rather than government funding.

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     Technology transfer and sponsored project offices that can
negotiate agreements with companies in a timely fashion, and that have
a mandate to maximize the impact of their university's research as
opposed to maximizing licensing income
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The University of Utah has hosted over 80 site visits in the past two years from groups struggling to redefine the commercialization functions at their university. As a result of these visits, we have come to understand the common challenges faced by universities attempting to commercialize inventions:

- Most universities are using a "cost reimbursement" model for running their technology operations. What this means is that the employees of the commercialization office are trying to get reimbursed for patents. Since a typical university is only able to license 25%, any licensing agreement has to pay the costs for three bad patents plus all the office overhead. At least 80% of university

commercialization offices lose money. We refer to this immediate focus as "squeezing the nickels."

- The University of Utah has adopted an "investment model" of commercialization, which encourages support for companies in the formation process. We provide product development support, space, services, and business plan support and gap funding in small amounts based on milestone achievement to support the value creation process. Income has remained robust while the university has accumulated tens of millions of dollars in company ownership over just a few years. University of Utah's start-ups raised over $246 million in venture financing in the past 3 years.
- We have "quit squeezing the nickels and now pick up the dollars." As a result of bringing value into the licensing process with gap funding and product development support, our up front licensing income has increased, which was a surprising result for us. Since we are co-investing in our technologies, we are able to get greater up front value as well as long term value.

``Templates'' for agreements on issues such as intellectual property, sponsored research, material transfer agreements, and visiting industry fellows that can reduce the time and cost required to commercialize university research and form university-industry partnerships

We do not agree that the "templates" approach is the best way to go. Schools that have adopted these are now seeing problems arise within the relationships. All partnerships are based on mutual respect and understanding, and for us the critical process is the partnership formation that begins any series of activities. No legal templates can take the place of this. Acceleration of results happens in solid relationships where the parties are aligned in the achievement of a common goal.

Another aspect of the university-industry partnership is collaboration on future research. Very few commercialization offices are involved in facilitating commercial-sponsored research, which is an opportunity for partnership that is lost. The University of Utah's Technology Commercialization Office is involved in facilitating, negotiating and managing commercial-sponsored research. This process begins when we partner to commercialize a technology, it helps anchor companies to do their future product development with the University, and the company hires the University's graduates, who are trained in areas supportive of the company's technology. The University of Utah has more than doubled commercial-sponsored research from $22 million in 2005 to $46 million in 2009 and expects to book over $50 million in 2010. The U's commercial-sponsored research is about 14% of the U's total research.

Models for promoting open innovation and an intellectual property ``commons''

The University of Utah is in the process of setting up a number of "pooling" arrangements with other universities and about to conclude a major agreement with a university that has a major complementary medical portfolio. We are also building a cooperative structure through our NSF Partnership for Innovation Grant that includes the

University of Washington, Oregon Health Sciences University, the University of Oregon, Oregon State University (PI), Portland State University, and Arizona State University. We are also in discussions with UC Davis and the University of Southern California to join this regional resource pooling and collaboration network.

University-industry collaborations that increase investment in pre-competitive research and development that is beyond the time horizon of any single firm

The Utah Science, Technology, and Research (USTAR) initiative is a state-investment in future technology clusters focused on economic development. The state has invested over $200 million in this effort, but funding was recently cut back significantly due to state budget problems.

University participation in regional economic development initiatives and efforts to strengthen ``clusters''

We are a principal in the Western Innovation Initiative, which is partially funded by NSF and is looking for additional funding to support seed capital formation in the West, develop resource sharing structures for equipment and expertise, IP pooling and joint marketing, and best practice development to accelerate commercialization at all research university partners. In addition, we are developing programs to support commercialization at non-research universities. There are approximately 200 universities that fall into some definition of “research university” and nearly 4,000 non-research universities. If the non-research universities can support even an average of 2 spinoffs per year, the number of economic entities emerging from universities every year will go up tenfold.

Supportive university policies such as ``industrial leave'' that allows faculty members to work for a new or existing company to commercialize their research

There is no systematic understanding of how state laws and university policies impact commercialization effectiveness. We have an NSF proposal pending that if funded will develop a systematic data base for studying these issues, model legislation that states can adopt to support commercialization, and policies universities can use as a point of reference in developing their own policies to support commercialization activities.

Bootstrapping Innovation Ecosystems

The University of Utah’s commercialization success was totally self-funded. The office receives no state or federal funding, although we greatly benefit and can only succeed due to the nation’s investment in basic research. Where we excel is efficiently turning this investment into outcomes that are economic development for the nation’s citizens and that support commercialization and education programs at the University.

Some universities participate in regional innovation ``ecosystems'' with dense concentrations of venture and angel investors, experienced entrepreneurs and managers, and a mix of large and small firms. These universities also have faculty who have been involved in commercialization of research and entrepreneurship, and can serve as

mentors and role models to faculty or students. How can universities and their external partners expand their ability to commercialize research in the absence of these favorable conditions?

In the 1990s, Utah was a distant suburb of the Bay Area. When we had successful technologies, they were most frequently moved to California by the investors and grew in California. Licensed cheap from the University, little value resulted in Utah or for the University, which seems to be common across research universities in the U.S. Utah lacked venture capital and the expertise to launch companies, which in turn reinforced the perception in the risk capital community that Utah was not a good place to grow business.

Utah's earliest successes in commercialization were predominantly in business software, led principally by Novell. Simultaneously, the success of the Sundance Film Festival brought a lot of creative tourism to Utah, supported the development of the Utah Ski industry, and created a market for second homes for Silicon Valley millionaires in the Park City and Deer Valley communities that are host to Sundance. To this day, the largest concentration of angel investors in Utah are in Park City, and much of the money is Silicon Valley money.

In 2004 a coalition of business, government, university, emerging venture capital and financial institution leaders began advocating for a state cluster strategy. Several initiatives emerged: (1) a stronger set of industry organizations set up along cluster lines; (2) a state funded Fund of Funds with $100 million to seed early stage venture firms; and (3) the USTAR initiative, which invests in university research infrastructure in order to support the expansion of federal research funding and in turn generate greater invention that can be turned into commercialization. This has been an outstanding success to date.

A "catalyzing coalition" was key to accelerating the ecosystem formation in Utah. The members in the business community most interested in this were not the technology companies that already existed in Utah. It was the home builders, car dealers, bankers, entertainment companies, insurance companies, restaurant chains, groceries, and other consumer businesses that were most concerned about where future consumers were going to make the wages necessary to keep the economy growing. The Salt Lake Chamber of Commerce played a key role along with the universities in keeping momentum behind the proposals that were developed and ultimately adopted and implemented.

From the University of Utah's perspective, the organization of the ecosystem has led to tangible and important increases in support that are in turn producing a higher rate of economic development. These include:

- $150 million in new buildings and laboratories and $9 million per year in new funding for starting packages to support research faculty hiring. The University's research funding has increased by 40% in the past three years (by $100 million).
- There are now 8 different seed venture funds supporting University spinoffs that collectively have $80 million available for investment.
- The amount of venture capital in Utah expanded significantly and more late-stage funding is coming directly from syndicates of Utah-based funds.

- The University's Entrepreneur in Residence program, which is all volunteers, has over 100 members, most of who live in Park City.

Metrics for Success

What are appropriate metrics for evaluating the success or failure of initiatives to promote commercialization of university research?

Although the University of Utah has had success spinning off technologies, it is important to note that we emphasize spinoffs because we are generating value in the technologies commercialized. It is important that, whatever metrics are used, there is a conscious understanding of what is happening in how value is generated and distributed. This is important because federal research dollars are the major mechanism used to support the research mission of the nation's universities (like Pell grants are the major mechanism for supporting the educational mission and are distributed differently across the wide number of U.S. institutions). When research universities squander value by failing to commercialize or "giving away" technologies with poor management, federal investment dollars in the country's research infrastructure are lost.

Certainly one set of "value generation measures" are effectiveness in translating research funding into commercialization outcomes like (1) spinoffs per research dollar; (2) licensing income per research dollar; and (3) patents generated per research dollar. There are national institutions that receive extraordinary amounts of research funding and produce very little output per research dollar, while other institutions with much more modest funding account for up to a third of total economic impact for the entire nation.

Data produced by the Association of University Technology Managers (AUTM), while in one sense providing very crude measures, are very instructive. Examining these data, sorting by performance indicators and studying different universities leads one to a realization the nation is not getting a very good return on its research investment. This exercise also exposes one to the tremendous variance in efficiencies across universities. They are large and appear to be getting larger as some universities start to enjoy great success while other universities are trapped in vicious cycles of failed cost recovery. University commercialization distributions look a lot like athletics programs: only about 20% make money, while the remaining 80% lose money and struggle for existence.

University commercialization, when done right, generates economic outcomes: high quality career employment opportunities, increased tax revenues for all levels of government, and growing revenues for business. It also generates the types of companies that contribute to the arts, social services, and whose employees volunteer. In short, it generates healthy communities. Easily tracked metrics include:

- Venture investments in university start-ups.
- Employment in university start-ups.
- Employment generated in enterprises founded on university technologies (typically local divisions).
- Payroll produced by university-affiliated companies.

- Taxes paid by direct and indirect employment resulting from commercialized university technologies.

Changes in Public Policy and Funding

What changes in public policy and research funding should the Obama Administration consider that would promote commercialization of university research? How could existing programs be modified or augmented to encourage commercialization of university research?

I am involved in a number of discussion groups advising the NSF, Commerce and the National Governors Association on policies for supporting commercialization of university research, plus we speak monthly at professional organizations all over the country. As I watch what is unfolding, I believe the country needs a new approach. Some observations:

- There is a famous management article called the "The Folly of Rewarding A while Hoping for B." The title says it all. From what I am observing, there are a lot of divisions within agencies that are good at distributing research funding and would like to distribute more research funding. The research funding distributed in the past produced highly varied – one might say little – economic impact. More research grants are not going to give us a different outcome.
- There are research agencies and there are agencies with an investment logic and an expectation of a demonstrated economic return. The nation needs an investment logic in how it expends money to support university commercialization. Universities need to understand the benefits, have models that they can deploy that will work, and they need to make a commitment to supporting commercialization with faculty promotion standards, in allocation of funding, and in relating to the communities in which they operate.
- The most powerful tool the federal government has to influence universities behavior is the overhead rate. The people that need to be influenced are not the presidents; it is the chief academic officers who have titles like provost and senior vice president. You will never win a chief academic officer's heart. The only solution is to buy their soul. And you do this by giving a 10% overhead incentive to support successful commercialization (and you only give it for demonstrated success, not promises). Buying the soul of chief academic officers is actually much cheaper than starting programs.
- There is a need for an organizing superstructure that spans university communities and provides models for best practices and helps integrate the non-research universities, which are clusters of creative and inventive people in their own right. These centers do not need to be the ecosystem, just a supplement to existing ecosystems with an objective of achieving important national goals. Also not hugely expensive.
- The nation is putting huge amounts into national labs and has relatively little to show for it. There is a case for investments in scaled facilities, but it is not clear that research funding should be similarly concentrated. A lot more "shots on goal" are going to produce more economic development than big bets on single experiments.

Summary

I do not think the University of Utah is an “ideal.” We have much to learn, and we are learning a great deal by hosting other universities, participating in efforts to develop the Western Innovation Initiative, and through forums sponsored by NSF and all the associations of university licensing managers (LES and AUTM are two). There is much to be gained by an engaged national discussion, and the federal government is in a position to provide the resources necessary to enrich existing ecosystems. There is also an opportunity to use incentives to produce different results than are currently being achieved. These results can only be different if the rewards are administered in a different way. Appropriately targeted incentives can be modest in comparison with the nation’s annual investment in science and produce dramatic results.

Everyone engage with this effort at the University of Utah, from the President to our individual licensing managers, are glad to help the nation achieve greater impact from its research investment. The changes we implemented are not changes that detract from the discovery and dissemination mission of the university. Our experience is that a focus on making a difference in the world, which is the bottom line motivation for commercialization, made us a better university.